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Refer to: E:WCM:1215:110299

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Subject: **AlliedSignal Engines & Systems Comments on Proposed §25.903(e)**

Dear Sirs:

While AlliedSignal Engines & Systems (E&S) is sympathetic with the need for an all engines out in-flight restart requirement, E&S believes that the materials presented for the revised §25.903(e) are inadequate and should not be submitted as a PPIHWG endorsed position to the Transport Aircraft & Engines Issues Group. We also submit that this proposal is not appropriate for the fast-track process and should be tasked as a full rule-making project.

Rationale for this conclusion include:

1. The submitted materials rely on material developed by the AIA/AECMA Inflight Restart Committee (PC345). This effort was prematurely terminated and its report submitted as a statement of status before there was technical agreement amongst the membership. The minority opinions or negative comments received on this rulemaking proposal are evidence of the lack of technical agreement.
2. There seems to be confusion among the members with regard to the status of the NPRM.
3. The proposed new rule language (assuming the version from AIA/AECMA report is current), **“[f]or turbine engine powered airplanes, it must be shown by test and analysis that a means to restart those engines needed for continued safe flight and landing of the airplane is provided following the flame out or shutdown of all engines,”** is inappropriately vague. The rule does not define the conditions that resulted in the “flame out or shutdown of all engines.” One or more of the engines may be damaged or not re-startable. There is no definition of the environmental conditions or minimum altitude at which the all engines shutdown condition might have to be recovered from. There is no exclusion for fuel exhaustion. The rule should clearly define the minimum safety standard by clearly specifying the condition(s) that must be addressed.
4. The draft Advisory Circular distributed to the PPIHWG contains a significant amount of regulatory material. Examples of this language include (but are not limited to):
 - Section 7: “Four conditions are to be addressed.”
 - Section 7: “Each zone must be identified in the Airplane Flight Manual. Sufficient tests must be carried out in each zone to validate it reliably.”

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- Sections 8.3 and 8.4” “The same *criteria* as in §8.2 should be used for times to relight and spool-up.” (Italics added for emphasis.)
- Section 8.5: “...for compliance with any of the section 7 restart conditions...”
- Section 8.5: “- a minimum of 95% APU start reliability must be demonstrated by test...”
- Section 8.5: “- if an APU assisted engine start is used for complying with the low altitude conditions I or IV...:

In addition to the above concerns, E&S offers the following technical comments on the proposed Advisory Circular.

1. Section 7: The statement “...the applicant will be expected to show by test or analysis supported by tests...” is inconsistent with the proposed rule language, “...it must be shown by test and analysis...” The rule language should be modified to allow either test or validated analysis.
2. Section 7, item 4: The text indicates that credit may be given for aircraft safety devices that minimize the likelihood of the all engines out condition (“aircraft design features which minimize the potential for inadvertent shutoff”, automatic relight, and automatic sub-idle stall recovery systems). However, there is neither additional guidance for the applicant on this subject, nor is this credit reflected in the “Acceptable Means of Compliance” listing in the table summarizing the compliance guidelines. Finally, there is no indication that the applicant can obtain similar credit for the presence of these safety systems for the other proposed compliance conditions. The summary table should be modified and credit for such systems should be extended to the other proposed conditions. Furthermore, there has been no substantive regulatory action taken to require that cockpit design preclude known historical causes of flight crew inadvertently shutting down last operating engine through the “normal” engine shutdown means. More emphasis should be directed to preventing the “all engines out” condition, not putting the primary focus on correcting this condition after it has happened.
3. Section 7, Item 4: No rationale is given for using $1.45 V_{\text{stall}}$ (clean configuration) as the initial speed for the proposed condition. The typical flight speed for approach at 10,000 ft should be used as the initial speed. STOL aircraft with low V_{stall} (clean configuration) would be at a regulatory disadvantage. This speed should be increased to at least 250 KT.
4. Section 7: Condition IV in the summary table calls for a 250 KT maximum initial speed for the demonstration based on this being the maximum permitted airspeed below 10,000 ft altitude. However, there is ongoing activity to alter this restriction and this should be reflected in this proposed condition if the condition is retained.
5. Section 8.2: Positive indication of normal start progression should be sufficient to demonstrate acceptable windmill starting capability. The time requirements should be removed from this section.

6. Section 8.3: The proposed fuel interruption of “not less than 30 seconds” for rapid relight demonstration is inconsistent with the proposed recognition times under Section 7, Item 1 (5-15 seconds) and Section 7, Item 4 (30 seconds or less), where rapid relight is an acceptable means of compliance. The fuel interruption or recognition times from Section 7 should be used in Section 8.3.
7. Section 8.3: Text proposes rapid relight demonstrations should be performed with “engine initially stabilized at idle.” There seems to be no justification for setting the engine power at “idle.”
8. Section 8.6(b): The text “the engine should relight and reaccelerate to its original power without any crew actions other than selecting ignition and fuel” assumes a particular cockpit design. This text should be deleted.

E&S remains committed to the development of a regulatory requirement for all engines out in-flight restart. However, due to the concerns outlined above, we can not support the current proposal at this time. Instead, we recommend that this project be removed from the fast-track process and tasked as a full, cooperative government-industry rule-making project. Furthermore, this rule should not be implemented without regulatory harmonization with the Joint Airworthiness Authorities (JAA).

Sincerely,



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